DOCUMENT RESUME

ED 287 063 CE 048 600

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TITLE Recreational Vehicle Trades.
INSTITUTION Ocean County Vocational Technical School, Toms River, N.J.
SPONS AGENCY New Jersey State Dept. of Education, Trenton. Div. of Vocational Education and Career Preparation.
PUB DATE [87]
NOTE 84p.; For related documents, see CE 048 597-603.
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS *Auto Mechanics; *Basic Skills; Behavioral Objectives; Communication Skills; Competency Based Education; Curriculum Guides; *Engines; *Integrated Curriculum; Job Skills; Learning Activities; Mathematics Skills; Sciences; Secondary Education; *Trade and Industrial Education; Units of Study; Vocational Education
IDENTIFIERS *Recreational Vehicles; Science Skills

ABSTRACT

This curriculum guide provides materials for a competency-based course in recreational vehicle trades at the secondary level. The curriculum design uses the curriculum infused model for the teaching of basic skills as part of vocational education and demonstrates the relationship of vocationally related skills to communication, mathematics, and science knowledge. Basic skills matrices are provided that indicate the curriculum in which each skill is studied. A list of course objectives precedes the curriculum. Course materials are divided into units, each of which correlates task, theory, communication skills, mathematics skills, science knowledge, and student outcomes. Units include tools, fasteners, measurement, shop manuals, engine, crankshaft and bearings, pistons and connecting rods, valves and valve train, lubrication system, fuel system, cooling system, gasoline, electrical system, battery, starting system, charging system, ignition system, drive train, drive line, differentials, suspension, steering systems, brake system, tires and wheels, heating and air conditioning, emission controls, and welding. (YLB)

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ED287063

Ocean County Vocational-Technical Schools

Recreational Vehicle Trades

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CE048600

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PHILOSOPHY OF EDUCATION

The Ocean County Vocational-Technical Education Program should consist of those courses, activities and experiences which are designed to prepare students for a successful entrance in a given field of work. The program should be based upon an analysis of the worker needs of the field of work, the opportunities and requirements for entrance, and the particular characteristics and needs of the students.

We believe that:

The school should educate and train the students to live effectively in our ever-changing world.

The school should provide, for each student, intensive training toward general and specific job objectives, and setting standards of performance in keeping with the requirements of that particular field of work.

All students should evidence the interest, aptitude, and ability to profit from the specialized instruction, and this should be a condition of entrance into or continuance in a given field of work.

Equal attention should be given in the school program to develop sound character, good citizenship, ability to think critically, and maintain good mental and physical health.

The school must be constantly striving to fulfill its ultimate purpose; that of serving the students and the community. The school should give careful consideration to the needs, interests, and capacities of the students and the educational and technical background, experience, training, and professional interest of the professional staff as they develop a working philosophy of education.

PREFACE

The curriculum format employed by this project is competency based and utilizes the Ocean County Vocational-Technical Schools' curriculum infused model for the teaching of basic skills as part of vocational education. The design demonstrates the relationship of vocationally related skills to communication, mathematics and science knowledge. Proficiencies with regard to student outcomes cannot be achieved without mastery in related academic areas. All student outcome objectives are predicated upon entry level skills which reflect the dictates of the job marketplace and industry. In addition, basic skills matrices developed by the district and vocational skill profiles are included. The totality of this package is designed to facilitate the vocational teaching process and to enhance the learning experiences of our students.

450 hours - 1 year course at O.C.V.T.S.
900 hours - 2 year course at O.C.V.T.S.
1000 hours - 2 year Beauty Culture course

120 hours per year needed for 5 credits
60 hours per year needed for 2½ credits

COURSE	TOTAL HOURS	HOURS SPENT COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
AIR CONDITIONING, REFRIGERATION AND HEATING	900	140	120	120	520
AUTO BODY REPAIR	900	130	120	125	525
AUTOMOTIVE MECHANICS	900	150	120	120	510
AUTOMOTIVE AND DIESEL ENGINE REBUILDING	900	216	126	125	433
BEAUTY CULTURE I AND II	1000	240	120	164	476
BUILDING TRADES	900	135	120	130	515
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL	450	200	60	40	150
CHILD CARE AIDE	900	240	120	122	418

POTENTIAL OPPORTUNITY FOR AWARDING ACADEMIC CREDITS FOR STUDENTS AT OCEAN COUNTY VOCATIONAL-TECHNICAL SCHOOL

450 hours - 1 year course at O.C.V.T.S.
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120 hours per year needed for 5 credits
60 hours per year needed for 2½ credits

COURSE	TOTAL HOURS	HOURS SPENT ON COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
COMMERCIAL ART AND PRINTING CAREERS	900	120	125	75	580
COMMERCIAL BUILDING CONSTRUCTION (MASONRY)	900	130	125	130	515
COMMERCIAL PHOTOGRAPHY & TELEVISION PRODUCTION	900	150	125	80	545
CUSTOM CABINETMAKING AND DESIGN	900	130	120	60	590
DENTAL ASSISTING	450	168	65	77	140
DESIGN DRAFTING	900	135	150	165	450
ELECTRICAL TRADES	900	106	120	124	550
FOOD SERVICES	900	206	132	125	437

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900 hours - 2 year course at O.C.V.T.S.
1000 hours - 2 year Beauty Culture course

120 hours per year needed for 5 credits
60 hours per year needed for 2½ credits

COURSE	TOTAL HOURS	HOURS SPENT ON COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
INDUSTRIAL AUTOMATION AND ELECTRONICS	900	129	140	132	499
INTERIOR ARCHITECTURE AND DESIGN	900	210	130	120	440
LANDSCAPING AND GREENHOUSE TECHNOLOGY	900	125	125	175	475
MACHINE SHOP TRADES	900	129	120	70	581
MARINE ENGINE AND BOAT SERVICE	900	164	120	125	491
MEDICAL-DENTAL RECEPTIONIST	450	173	60	77	140
MEDICAL SKILLS AND RELATED HEALTH CAREERS	450	135	65	125	125
MEDICAL SKILLS (ADVANCED)	450	125	60	125	140

450 hours - 1 year course at O.C.V.T.S.
900 hours - 2 year course at O.C.V.T.S.
1000 hours - 2 year Beauty Culture course

120 hours per year needed for 5 credits
60 hours per year needed for 2½ credits

COURSE	TOTAL HOURS	HOURS SPENT ON COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
PLUMBING AND HEATING	900	140	120	120	520
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	900	125	130	60	585
T.V. AND COMPUTER REPAIR	900	125	150	175	450
WELDING	900	135	120	100	545

COMMUNICATION SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School. The asterisk indicates that the topic is studies in that curriculum.

COURSE	Functional Reading Skills	Vocabulary	Identifying Main Ideas	Meanings in Context	Inferences	Fact-Opinion Distinction	Signal Words	Parts of Textbook/Manual	Following Directions	Outlining and Notetaking	Interpretation Maps, Graphs & Charts	Interpretation Diagrams, etc.	Test Taking Skills	Expository Writing Skills	Problem Solving	Spelling	Oral Communication	Study Skills	Resume Writing	Job Application Skills
AIR CONDITIONING, REFRIGERATION AND HEATING	*	*		*	*	*	*		*	*	*	*		*	*	*	*		*	*
AUTO BODY REPAIR	*	*		*	*	*	*		*	*	*	*		*	*	*	*		*	*
AUTO MECHANICS	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*
AUTOMOTIVE & DIESEL ENGINE REBUILDING	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*		*	*
BEAUTY CULTURE I AND II	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*	*
BUILDING TRADES	*	*		*	*	*	*		*	*	*	*		*	*	*	*		*	*
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL	*	*	*	*	*	*	*		*		*	*		*		*	*		*	*
CHILD CARE AIDE	*	*	*	*	*	*	*		*	*	*		*	*		*	*	*	*	*
COMMERCIAL ART AND PRINTING CAREERS	*	*	*	*	*	*	*		*	*	*	*		*	*	*	*		*	*
COMMERCIAL BUILDING CONSTRUCTION	*	*	*		*	*	*		*	*	*	*		*			*		*	*
COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION	*	*	*	*	*	*	*		*	*	*	*		*	*	*	*		*	*
CUSTOM CABINETMAKING AND DESIGN	*	*		*	*	*	*		*	*	*	*		*	*	*	*		*	*
DENTAL ASSISTING	*	*	*	*	*	*	*		*	*	*	*		*	*	*	*		*	*

COMMUNICATION SKILLS CONTINUED

COURSE	Functional Reading Skills	Vocabulary	Identifying Main Ideas	Meanings in Context	Inferences	Fact-Opinion Distinction	Signal Words	Parts of Text-book/Manual	Following Directions	Outlining and Notetaking	Interpretation Maps, Graphs, Charts	Interpretation Diagrams, etc.	Test Taking Skills	Expository Writing Skills	Problem Solving	Spelling	Oral Communication	Study Skills	Resume Writing	Job Application Skills
DESIGN DRAFTING	*	*	*		*	*	*		*	*	*	*		*	*				*	*
ELECTRICAL TRADES	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*			*	*
FOOD SERVICES	*	*	*		*	*			*		*	*		*	*		*		*	*
INDUSTRIAL AUTOMATION AND ELECTRONICS	*	*	*		*	*			*		*	*		*	*		*		*	*
INTERIOR ARCHITECTURE AND DESIGN	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*		*	*
LANDSCAPING AND GREENHOUSE TECHNOLOGY	*	*	*	*	*	*	*		*	*	*	*		*	*		*		*	*
MACHINE SHOP TRADES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MARINE ENGINE AND BOAT SERVICE	*	*	*		*	*	*	*	*	*	*	*		*	*				*	*
MEDICAL-DENTAL RECEPTIONIST	*	*	*	*	*	*	*		*	*	*	*		*		*	*	*	*	*
MEDICAL SKILLS AND RELATED HEALTH CAREER	*	*	*	*	*	*	*		*	*	*	*		*		*	*	*	*	*
MEDICAL SKILLS (ADVANCED)	*	*	*	*	*	*	*		*	*	*	*		*		*	*	*	*	*
PLUMBING AND HEATING	*	*	*	*	*	*	*	*	*	*	*	*		*	*				*	*
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	*	*	*	*	*	*	*	*	*	*	*	*		*	*				*	*
T.V. AND COMPUTER REPAIR	*	*	*	*	*	*	*	*	*		*	*		*	*				*	*
WELDING	*	*	*			*	*		*	*	*	*		*	*				*	*

MATHEMATICS SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School. Those listed as "Not Available" do not offer enough hours to qualify for credits at your high school. However, we have noted the skills covered. Those listed with an asterisk after the title are eligible. The asterisk indicates that the topic is studied in that curriculum.

COURSE	Whole Numbers	Common Fractions	Decimals	Percentages	Weights and Measurements	Ratio and Proportion	Powers and Roots	Formulas	Estimating	Geometry	Basic Trigo-metric Function	Graphs
AIR CONDITIONING, REFRIGERATION AND HEATING	*	*	*	*	*	*	*	*	*	*	*	*
AUTO BODY REPAIR	*	*	*	*	*	*	*	*	*	*		*
AUTO MECHANICS	*	*	*	*	*	*	*	*	*			*
AUTOMOTIVE AND DIESEL ENGINE REBUILDING	*	*	*	*	*	*	*	*	*			*
BEAUTY CULTURE I AND II	*	*	*	*	*	*	*	*	*	*	*	*
BUILDING TRADES	*	*	*	*	*	*	*	*	*	*	*	*
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL	*		*	*		*			*			*
CHILD CARE AIDE	*	*	*	*	*	*		*	*	*	*	*
COMMERCIAL ART AND PRINTING CAREERS	*	*	*	*	*	*		*	*	*		*
COMMERCIAL BUILDING CONSTRUCTION	*	*	*	*	*	*		*	*	*	*	*
COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION	*	*	*	*	*	*		*			*	
CUSTOM CABINETMAKING AND DESIGN	*	*	*	*	*	*	*	*	*	*	*	*
DENTAL ASSISTING	*	*	*	*	*	*		*				*

MATHEMATICS SKILLS CONTINUED

COURSE	Whole Numbers	Common Fractions	Decimals	Percentages	Weights and Measurements	Ratio and Proportion	Powers and Roots	Formulas	Estimating	Geometry	Basic Trigo-metric Function	Graphs
DESIGN DRAFTING	*	*	*	*	*	*		*	*	*	*	
ELECTRICAL TRADES	*	*	*	*	*	*	*	*	*	*		*
FOOD SERVICES	*	*	*	*	*			*	*			*
INDUSTRIAL AUTOMATION AND ELECTRONICS	*	*	*	*	*	*	*	*	*	*	*	*
INTERIOR ARCHITECTURE AND DESIGN	*	*	*	*	*	*		*	*			*
LANDSCAPING AND GREENHOUSE TECHNOLOGY	*	*	*	*	*	*		*			*	*
MACHINE SHOP TRADES	*	*	*	*	*	*	*	*	*	*	*	*
MARINE ENGINE AND BOAT SERVICE	*	*	*	*	*	*		*			*	*
MEDICAL-DENTAL RECEPTIONIST	*	*	*	*	*	*	*	*	*	*		*
MEDICAL SKILLS AND RELATED HEALTH CAREERS	*	*	*	*	*	*		*			*	
MEDICAL SKILLS (ADVANCED)	*	*	*	*	*	*		*			*	
PLUMBING AND HEATING	*	*	*	*	*	*		*			*	*
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	*	*	*	*	*	*		*			*	*
T.V. AND COMPUTER REPAIR	*	*	*	*	*	*	*	*			*	*
WELDING	*	*	*	*	*	*		*			*	*

SCIENCE SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School. Those listed as "Not Available" do not offer enough hours to qualify for credits at your high school. However, we have noted the skills covered. Those listed with an asterisk after the title are eligible. The asterisk indicates that the topic is studied in that curriculum.

	HUMAN ANATOMY						ASTRONOMY			CHEMISTRY			PHYSICS					ECOLOGY				
COURSE	Cellular Theory	Skeletal System	Muscles	Systems of Body	Diseases	Psychology	Solar System	Gravity	Weather	Matter	Chemical Reactions	Applied Chemistry	Light	Magnetism	Heat	Magnetism and Electricity	Nuclear Energy	Botany	Food Production	Fuels	Nutrition	Waste Disposal
AIR CONDITIONING, REFRIGERATION AND HEATING							*	*	*	*	*	*			*	*				*	*	
AUTO BODY REPAIR								*	*	*	*	*	*	*	*					*		*
AUTO MECHANICS								*		*	*	*	*	*	*	*				*		
AUTOMOTIVE DIESEL AND ENGINE REBUILDING								*		*	*	*		*	*	*	*			*		*
BEAUTY CULTURE I AND II	*	*	*	*	*	*					*	*									*	
BUILDING TRADES							*	*	*	*	*	*	*		*	*				*		
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL		*	*	*		*																
CHILD CARE AIDE	*	*	*	*	*	*															*	
COMMERCIAL ART AND PRINTING CAREERS	N	O	T	A	V	A	I	* L	A	* B	* L	* E	*		*	*						*
COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION	N	O	T	A	V	* A	I	* L	A	* B	* L	* E	*		*	*						*
CUSTOM CABINETMAKING AND DESIGN	* N	O	T	A	V	A	I	* L	A	* B	* L	* E			*			*				

SCIENCE SKILLS CONTINUED	HUMAN ANATOMY						ASTRONOMY			CHEMISTRY			PHYSICS					ECOLOGY				
COURSE	Cellular Theory	Skeletal System	Muscles	System of Body	Diseases	Psychology	Solar System	Gravity	Weather	Matter	Chemical Reactions	Applied Chemistry	Light	Magnetism	Heat	Magnetism and Electricity	Nuclear Energy	Botany	Food Production	Fuels	Nutrition	Waste Disposal
DENTAL ASSISTING	*	*	*	*	*	*				*	*	*									*	
DESIGN DRAFTING							*		*	*		*	*		*	*				*		
ELECTRICAL TRADES							*	*	*				*	*	*	*	*		*			
FOOD SERVICES					*	*					*	*							*		*	
INDUSTRIAL AUTOMATION AND ELECTRONICS								*		*			*	*	*	*	*			*		
INTERIOR ARCHITECTURE AND DESIGN		*	*			*	*	*	*	*	*	*	*		*	*						
LANDSCAPING AND GREENHOUSE TECHNOLOGY							*	*	*		*	*						*	*	*		
MACHINE SHOP TRADES										*					*	*				*		
MARINE ENGINE AND BOAT SERVICE								*	*	*	*	*	*	*	*					*		
MEDICAL-DENTAL RECEPTIONIST	N	* O	* T	* A	* V	* A	I	L	A	B	* L	E										
MEDICAL SKILLS AND RELATED HEALTH CAREERS	*	*	*	*	*	*				*	*										*	
MEDICAL SKILLS (ADVANCED)	*	*	*	*	*	*				*	*										*	
PLUMBING AND HEATING								*	*	*	*	*			*					*		
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	N	O	T	A	V	A	I	* L	A	* B	* L	* E	*	*	*					*		
T.V. AND COMPUTER REPAIR										*	*	*	*	*	*	*						
WELDING								*		*	*	*		*	*					*		

COURSE OBJECTIVES

1. To prepare students with entry level skills, abilities and knowledge for employment in the recreational vehicle trades.

2. To present 900 hours of instruction and practice in the recreational vehicle trades in accordance with the course curriculum and skill profile outline.

3. To provide a detailed summary evaluation of the proficiency achieved by each student representing the most important content areas presented in the recreational vehicle trades skill profile.

4. To help each student develop positive attitudes and ideals related to their occupation in the recreational vehicle trades and understand their own capabilities and potential.

5. To instill in each student the need to plan for their professional growth through continuous learning in their chosen occupation.

STUDENT ACTIVITIES

All students enrolled in the Ocean County Vocational-Technical School are encouraged to join Vocational Industrial Clubs of America (VICA). Student activities are infused into each program. Each building has a student government and a student activities program separate from VICA. Additionally, students from each center and every class are encouraged to participate in the VICA Leadership and Job Demonstration Contests which begin in the centers and radiate throughout the district as Ocean County Vocational-Technical School inter school winners are chosen.

Student activities emphasize the basic precepts of VICA, as well as, the basic tenets of democracy. Within that context, each of our programs teaches the dignity of work, high standards in trade ethics and safety, and a belief in the free enterprise economic system.

UNIT: TOOLS

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Utilizing shop hand tools	A. Description of hand tools used in the shop B. Safety precautions C. Do's and Don'ts D. Rights and wrongs E. Standard F. Metric	A. Functional reading skills B. Vocabulary C. Identifying main ideas	A. Whole numbers B. Fractions C. Decimals D. Ratio E. Rule graduations	A. Energy B. Force C. Physics D. Magnetism	A. The student will be able to identify various hand tools B. The student will be able to describe tools C. The student will be able to explain the correct way to use tools D. The student will be able to name the types of tools E. The student will be able to perform with tools F. The student will be able to repair tools
II. Utilizing power tools	A. Description of shop power tools 1. Electricity 2. Compressed air 3. Hydraulic pressure B. Safety precautions	A. Identifying main ideas B. Meaning in context C. Inferences D. Following directions	A. Weights and measurements B. Ratio	A. Energy B. Gravity C. Physics D. Solvent E. Cleaning agents	A. The student will be able to identify various power tools B. The student will be able to describe the cautions of power tool C. The student will be able to explain the purpose of power tools D. The student will be able to name the types of motion E. The student will be able to perform with power tools F. The student will be able to repair power tools

UNIT: FASTENERS

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Utilizing fasteners	A. Describe the fasteners used in the mechanics field B. How to use fasteners	A. Functional reading skills B. Vocabulary C. Classifications D. Series 1. Coarse 2. Fine 3. Extra fine E. Head markings F. Application	A. Pitch Threads per inch B. VSC System C. Metric system	A. Tensile strength B. Material C. Quality	A. The student will be able to discuss screw threads B. The student will be able to explain 1. Pitch 2. Series 3. Classes C. The student will be able to identify various markings to indicate strength D. The student will be able to list and describe various types of 1. Nuts 2. Screws 3. Bolts 4. Stud 5. Washer 6. Snap rings 7. Key and key-way 8. Spline 9. Rivet 10. Set screw 11. Self-tapping 12. Speed nut 13. Self-locking 14. Threaded insert E. The student will be able to choose and demonstrate using connect fastener and tool

UNIT: MEASUREMENT

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Measuring	A. Two systems of measurement 1. USCS 2. Metric B. Explain importance	A. Functional reading skills B. Vocabulary C. Outlining and note taking	A. USCS B. Metric system C. Meter D. Kilometer F. Kilogram F. Centimeter G. Milometer H. Liter I. Conversion tables 1. Length 2. Volume J. Linear measurement K. Decimal reading into fractions		A. The student will be able to describe the two basic systems B. The student will be able to list basic units of measurement in inch system C. The student will be able to explain how tc convert measurements from one system into the other system D. The student will be able to record (specs) perform measurement, compare measurement, and make adjustment E. The student will be able to demonstrate using feeler gauges, micrometer, dial indicator, verniel caliper, and depth and hole gauges

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Utilizing shop manuals	A. Explanation and description of the various sources of mechanic service information and specification	A. Functional reading skills B. Vocabulary C. Identifying main ideas D. Signal words E. Following directions F. Outlining and note taking	A. Measuring B. Machining specifications		A. The student will be able to list the six steps in any service job as a mechanic 1. Measuring 2. Disassembly 3. Machining 4. Installing 5. Reassembly 6. Adjustment B. The student will be able to explain variou sources of information C. The student will be able to describe and record specifications before starting servic D. The student will be able to produce a job sheet with step-by-ste procedures highlightin the following 1. Notes 2. Cautions

UNIT: THE ENGINE

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analyzing engine operation	A. Introduction to the construction and operation of the internal combustion engine B. Description and explanation of the fundamentals inside the engine	A. Functional reading skills B. Vocabulary C. Identifying main ideas D. Fact/Opinion distinction E. Signal words F. Manuals	A. Formulas for the following 1. Piston displacement 2. Cylinder bore 3. Compression ratio 4. Port size 5. cc heads 6. Cutting valve angles and degrees 7. Valve train geometry 8. Gear and chain drive 9. Cycle sequence 10. Work in feet and pounds 11. Firring order	A. Formulas for the following 1. Gravity 2. Atmospheric pressure 3. Vacuum 4. Heat 5. Rotary motion 6. Reciprocating motion 7. The four strokes 8. Air - fuel mixture 9. Compression 10. B.D.C. and T.D.C. 11. Work against force 12. Volumetric efficiency 13. Torque 14. Friction and brake horsepower 15. Expanding force 16. Explosion	A. The student will be able to explain various ways engines are classified B. The student will be able to describe reciprocating motion C. The student will be able to identify various valve arrangements D. The student will be able to demonstrate how the four cycle engine works E. The student will be able to perform dead timing F. The student will be able to calculate piston displacement G. The student will be able to calculate compression ratio

UNIT: THE ENGINE

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
II. Taking engine measurement	A. Explanation of the different ways engines are measured B. Discription of piston displacement C. Two way to measure 1. Physical 2. Performance D. The bore and stroke of an engine 1. T.D.C. 2. B.P.C.	A. Functional reading skills B. Vocabulary C. Outlining and note taking D. Spelling E. Oral communication	A. Bore is diameter B. Oversquare - greater than C. Volume D. Compression ratio E. Feet, pounds, and metric F. Torque G. Horsepower H. Calculation	A. Engine efficiency B. Atmospheric pressure C. Fuel	A. The student will be able to explain what bore and stoke means B. The student will be able to explain piston displacement C. The student will be able to explain how it is calculated D. The student will be able to explain compression ratio
III. Analyzing engine types	A. Discription and review of various types of engines B. Explanation of classification 1. Number and arrangement 2. Arrangement of valves 3. Types of cooling	A. Functional reading skills B. Vocabulary C. Writing D. Oral communication	A. Bore is diameter B. Oversquare - greater than C. Volume D. Compression ratio E. Feet, pounds, and metric F. Torque G. Horsepower H. Calculation	A. Cooling system B. Fuel injection C. Water jackets	A. The student will be able to explain the various ways to identify an engine B. The student will be able to describe various cyl arrangement C. The student will be able to describe the types of valve systems D. The student will be able to explain the firmino order

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
IV. Engine construction	A. Explanation of cylinder block B. Describe cylinder head C. Review 1. Molding 2. Machining work D. Review 1. Intake system 2. Exhaust system	A. Functional reading skills B. Oral communication C. Demonstrations D. Cutaways identification E. Spelling F. Outlining and note taking	A. Machine surface B. Tapped hole size	A. Molding and casting B. Heat C. Gasket compounds D. Aluminum, steel, and cast iron E. Metal	A. The student will be able to explain how an engine is manufactured B. The student will be able to describe the machining process C. The student will be able to describe water jackets D. The student will be able to explain the reason for gaskets and the types E. The student will be able to explain the intake system and exhaust system

UNIT: CRANKSHAFT AND BEARINGS

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of crankshaft and bearings	A. Explanation of engine 1. Crankshaft 2. Bearings a. Flywheel b. Vibration damper c. Counter weight	A. Functional reading skills B. Identifying main ideas C. Vocabulary D. Spelling	A. Crank size B. Bearing size C. Firring order D. Oil clearnace E. Torque F. Counter weight	A. Hammonio balancer B. Torsional vibration C. Vibration	A. The student will be able to describe typical crank B. The student will be able to explain the balance process C. The student will be able to describe the vibration damper D. The student will be able to explain the purpose of engine bearings

UNIT: PISTONS AND CONNECTING RODS

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of pistons and connecting rods	A. Purpose of pistons and rods B. Construction C. Types 1. Pistons 2. Rods 3. Bearings 4. Rings D. Bearing lubrication E. Types of rings	A. Functional reading skills B. Writing C. Oral communication	A. Press fit B. Piston size C. Clearances D. Stroke of piston E. Offset	A. Fuel B. Oil control C. Types of metals D. Expansion E. Contraction	A. The student will be able to explain the purpose and construction of pistons and connecting rods B. The student will be able to explain and demonstrate how parts are connected C. The student will be able to describe how expansion is controlle D. The student will be able to explain how rings work

UNIT: VALVES AND VALVE TRAIN

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of valves and valve train	A. Describe valve train B. Discuss types and how they are driven C. Review timing D. Discribe and demonstrate valve train E. Review lifters, rockers, and push rods	A. Functional reading skills B. Writing C. Oral communication	A. Ratio B. Lift cam and duration C. Calculation of valve size and cam size D. Cutting valve face, stems, and seats E. Clearance F. Timing G. Degrees	A. Valve overlap B. Valve heat C. Rotation and slide	A. The student will be able to explain the construction and operation of valve train B. The student will be able to describe types of arrangements C. The student will be able to demonstrate firring order in sequence with valves

UNIT: LUBRICATION SYSTEM

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of the lubrication system	A. Review engine lubrication system and parts B. Discribe types of lubrication C. Discuss how lubrication oil gets to parts D. Demonstration of lubrication 1. Thickness 2. Application E. Oil additives F. Describe press indicators	A. Functional reading skills B. Writing C. Oral communication D. Identifying main ideas E. Outlining and note taking F. Demonstration G. Vocabulary H. Spelling	A. Multiple viscosity B. Pound and pressure C. Weight of lubrication D. Multigrade E. Chemical number	A. Visocsity B. Oil cooler C. Pout point D. Inhibitor E. Detergent F. Dispersant G. Synthetic	A. The student will be able to explain how oil is produced B. The student will be able to describe ways oil is rated - SAE C. The student will be able to describe the various additives and their purpose D. The student will be able to explain oil circulation E. The student will be able to describe and list the components ir the lubrication syster F. The student will be able to explain the importance of oil pressure G. The student will be able to describe the pro's and con's of kinds of oil and weather conditions H. The student will be able to discuss synthe tic oil and the price I. The student will be able to discuss variou types of oil coolers and filters

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of the fuel system	A. Describe the carburetor system B. Carburetor function C. Working components D. Types of circuits E. Fuel tanks F. Fuel lines G. Filters and air cleaners H. Fuel pump I. Various types of carburetors J. Carburetor diagnosis and repair K. Overhaul of carburetor L. Multi-carburetor synchronization	A. Functional reading skills B. Writing C. Outlining and note taking D. Demonstration E. Identifying main ideas F. Films G. Handouts H. Cutaways	A. Manual specifications B. Adjustment screws Float adjustment D. Fuel - air ratio E. Carburetor sizes F. Jet sizes G. Mileage per gallon H. Analyzed specifications I. Carburetor synchronization	A. Vaporization B. Vapor lock C. Atmospheric pressure D. Sea level versus mountains E. Venturi F. Air - fuel ratio G. Manifold heat H. Cooling fuel I. Control devices J. Vacuum	A. The student will be able to explain how a carburetor works B. The student will be able to list and explain each carburetor system 1. Float system 2. Idle 3. Main 4. Power 5. Accelerator 6. Choise C. The student will be able to adjust a carburetor to manufacturer specifications D. The student will be able to adjust a carburetor for inspection E. The student will be able to describe component parts and the purpose of 1. Fuel pump 2. Filter 3. Air cleaner 4. Senders 5. Vapor lines F. The student will be able to describe the ventrui constriction operation G. The student will be able to troubleshoot, service, repair, and rebuild a carburetor

UNIT: COOLING SYSTEM

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of the cooling system	A. Cover construction and operation of a cooling system B. Various types of cooling systems C. Heat development D. Overheating E. Different ways heat is removed F. Overcooling G. Review water, anti freeze, and pressure cap H. Cross flow, down flow, expansion tanks, and heaters I. Liquid and air cooling	A. Functional reading skills B. Notebook C. Identifying main ideas D. Demonstration E. Oral communication	A. Displacement for cooling B. Pressure pounds C. Temperature D. Thermostat E. Measuring	A. Mixing B. Ratio C. Radiating D. Solution	A. The student will be able to describe the purpose of the cooling system and how it works B. The student will be able to explain how the water pump and thermostat work C. The student will be able to describe the construction and various parts D. The student will be able to explain pressurizing E. The student will be able to describe coolant and its composition

UNIT: GASOLINE

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of gasoline	A. Gasoline - what it is and how it works in the engine B. Characteristics of good gas C. Review the crude oil refining process D. Combustion E. Detonation F. Pre-ignition G. Octane in an engine H. H.C. and C.O.	A. Functional reading skills B. Writing C. Report D. Demonstration E. Identifying main ideas F. Films G. Handouts	A. Ratio B. Rating C. Reading analyser D. Corrections to specifications	A. Violatility B. Heat C. Detonation D. Additives E. Process F. Vaporize G. Oxidation H. Lead	A. The student will be able to describe the composition of gas B. The student will be able to discuss the crude oil process C. The student will be able to describe the additives that are mixed and why D. The student will be able to explain violatility and how it effects engine operation E. The student will be able to explain lead and unleaded gasoline F. The student will be able to explain the relationship between compression ratio and detonation G. The student will be able to explain the reasons for pre-ignition

UNIT: ELECTRICAL SYSTEM

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analyzing the electrical system	A. Electricity and electronics B. The many jobs of electrical system C. One wide systems D. Alternator current E. Direct current F. Diode and transistors G. Circuits	A. Functional reading skills B. Vocabulary C. Spelling D. Meanings in context E. Opinion distinction F. Signal words G. Following diagrams H. Problem solving I. Outside report J. Notebook K. Oral communication	A. Measuring current B. Testing high and low voltage C. Measuring resistance in ohms	A. Magnets B. Lines of force C. Electromagnets demonstration D. Ohms law	A. The student will be able to discuss 1. Electricity 2. Electric current 3. Current in terms of electron movement B. The student will be able to explain how magnets work and what lines of force are C. The student will be able to list the various electronic devices now used in the mechanic field

UNIT: BATTERY

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of the battery	A. Construction and operation B. Battery testing C. Battery service D. Battery safety E. Six and twelve volt systems	A. Student demonstrations B. Definition of terms 1. Resistance 2. Current 3. Voltage 4. Insulation 5. Conduction	A. High discharge testing B. Load testing C. Hydrometer readings	A. Lead - acid units B. Producing electrical current by chemical means	A. The student will be able to perform battery service 1. Testing 2. Charging 3. Jumping 4. Replacing

UNIT: STARTING SYSTEM

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of the starting system	A. Construction and operation of the starting system B. Troubleshooting and servicing of starting motors C. Identify various types and their operation D. Testing field type E. Testing using sun VAT 40	A. Functional reading skills B. Outlining and note taking C. Signal words D. Wiring circuit E. Vocabulary 1. Armature 2. Brushes 3. Commutation 4. Solenoid	A. Armature gear ratio B. Ring gear ratio C. Starter R.P.M. D. Crankshaft R.P.M. calculation	A. Magnetio poles 1. Attract 2. Repel B. Producing magnetic field C. Current flow	A. The student will be able to describe the operation of a starting motor B. The student will be able to explain how it works C. The student will be able to list the possible causes of a troubled starter D. The student will be able to perform starter service and repair E. The student will be able to install a new starter F. The student will be able to troubleshoot a starting problem G. The student will be able to replace and/or service solenoid

UNIT: CHARGING SYSTEM

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of the charging system	A. Discuss 1. Generators 2. Alternators 3. Regulators B. Conversion of alternator current to direct current C. Principles and construction D. Various types and identification	A. Functional reading skills B. Outlining and note taking C. Reading circuits D. Vocabulary 1. Rectifier 2. Armature 3. Commutation 4. Solid state 5. Stater 6. Rotor 7. Diode	A. Current induced B. Various electric valves C. Charging rates	A. Megnetic field B. Alternator principles	A. The student will be able to describe the difference between the generator and the alternator B. The student will be able to explain the charging system operation C. The student will be able to explain the purpose of regulators D. The student will be able to perform replacement of parts in system E. The student will be able perform polarizing of system and components F. The student will be able to troubleshoot the charging system 1. Field test 2. Shop test

UNIT: IGNITION SYSTEM

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of the ignition system	A. Discuss the ignition, the different components, and how they all work together B. Action primary C. Action secondary D. Distributor cap and rotor E. Point system F. High-energy system G. Ignition timing H. Replace parts and set specifications in vehicle I. Set distributor up on sun machine	A. Functional reading skills B. Outlining C. Service manuals D. Specification sheets E. Task sheets F. Wiring diagrams G. Student demonstrations H. Student project teaching aid	A. Voltage B. Amp's C. Primary and secondary output D. Centrifugal advance degrees	A. Point field collapses B. Vacuum advance C. Mechanical advance D. Centrifugal advance E. Reluctor pick up F. Voltage surge	A. The student will be able to explain the purpose of the ignition system B. The student will be able to describe the components in the system C. The student will be able to describe the two circuits and explain how they work D. The student will be able to identify and explain the point system and electronic system E. The student will be able to explain the purpose of centrifugal and vacuum advance mechanisms and how they work F. The student will be able to perform servic and repair on both systems G. The student will be able to troubleshoot both types of ignition systems

UNIT: DRIVE TRAIN

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of drive trains	A. Describe the construction, operation and troubleshooting of various drive trains 1. Manual 2. Automatic B. Identify 1. Primary gears 2. Secondary gears 3. Final drives C. Discuss various types and styles of clutch mechanisms D. Explain linkages operation	A. Functional reading skills B. Outlining and note taking C. Service manuals D. Cutaways E. Student projects F. Demonstrations	A. Gear ratio B. Size clutches C. Plate pressure D. Release travel E. Synchronization F. Overdirve G. Spur gear ratio	A. Power flow B. Fluids C. Friction D. Resistance E. Torque	A. The student will be able to explain the purpose of construction and operation of clutches B. The student will be able to discuss clutch troubles and their possible causes C. The student will be able to service and repair both manual and hydraulic clutches D. The student will be able to troubleshoot clutch problems and adjust linkage E. The student will be able to explain how synchronizers work F. The student will be able to discuss transmission troubles and possible causes G. The student will be able to identify various fluid requirements H. The student will be able to replace and/or repair the transmissio and linkage

UNIT: DRIVE LINE

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of drive line	A. Discuss the purpose, construction, and operation of the drive line and component parts B. Explain the operation of the following 1. Drive shafts 2. Propeller shafts 3. Universal joints 4. Slip joints 5. Carrier bearing 6. C.V. joints 7. Splines C. Identify the types of the following 1. Front engine bear drive 2. Front wheel drive 3. Four-wheel drive and transfer case 4. Gears and chains	A. Functional reading skills B. Outlining C. Film D. Manuals E. Tasks F. Projects G. Demonstrations H. Vocabulary I. Spelling J. Identifying main ideas K. Writing skills L. Signal words	A. Gear ratio B. Fractions C. Percents D. Measurements E. Changing lengths F. Angle of drive G. Speed fluctuation	A. Transfer of engine's power to wheels B. Force of tuning C. Torque D. C.V. joint	A. The student will be able to explain the construction and operation of the drive line B. The student will be able to troubleshoot a drive line, identify the problem, and estimate the time and cost C. The student will be able to service and repair various types of drive line D. The student will be able to discuss troubles and possible causes of drive line E. The student will be able to perform lubrication requirements

UNIT: DIFFERENTIALS

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of differentials	A. Covers the construction and operation of differential drive axles B. Identifies the following 1. Single drive 2. Slip clutch type 3. Lock out 4. Live axle C. Explain wheel travel in turns D. Discuss power flow and gear direction E. Diagnosing problems F. Service, replace and repair of differentials	A. Functional reading skills B. Writing skills C. Outlining D. Film E. Manuals F. Tasks G. Projects H. Demonstrations I. Vocabulary J. Spelling K. Signal words	A. The difference in wheel travel as vehicle makes a 90^{o} turn and radius B. Gear ratio C. Whole numbers D. Tire size E. Mileage	A. Physics B. Rotary motion C. Torque D. Turning effect E. Power flow F. Pressure	A. The student will be able to discuss the purpose, construction, and operation of a differential B. The student will be able to explain how various types work C. The student will be able to discuss troubles and possible causes D. The student will be able to diagnose troubles E. The student will be able to perform adjustments F. The student will be able to service lubrication required G. The student will be able to identify noise trouble

UNIT: SUSPENSION

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of the suspension system	A. Covers springs and suspension of front and rear B. Describe various types used C. Explain how they work D. Discuss the purpose and operation E. Identify and state the function of the following 1. Types of springs 2. Shocks and struts 3. Frame mounts 4. Control arms 5. Ball joints 6. Rod ends 7. Spindle 8. Stabilizer 9. MacPherson 10. Suspension service F. Describe alignment	A. Functional reading skills B. Writing skills C. Spelling D. Films E. Oral communication F. Demonstration G. Teacher aides H. Task I. Vocabulary J. Trade talk	A. Whole numbers B. Frame travel C. Weights and measurements	A. Spring rate B. Torsion twist C. Forward and backward motion D. Stabilizer bar compress and expand E. Weight transfer F. Body roll	A. The student will be able to explain the purpose of suspension of the front and rear B. The student will be able to describe various types and explain how they work and how they are attached C. The student will be able to identify the type of system and name and list the parts D. The student will be able to service and repair defective components E. The student will be able to troubleshoot and make connection F. The student will be able to perform alignment to the manufactures specifications

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of steering systems	A. Covers steering systems and explains the different front end angles B. Discuss front end geometry C. Identify various steering gears D. Explain construction and operation of linkage E. Identify 1. Manual steering 2. Power steering 3. Rack and pinion 4. Leg profile F. Explain wheel alignment procedures check list	A. Functional reading skills B. Writing skills C. Spelling D. Vocabulary E. Trade talk F. Outlining and note taking G. Report H. Films I. Demonstration	A. Front end geometry B. Camber C. Axis inclination D. Caster E. Toe in F. Toe out G. Turning radius H. Degrees from vertical angle I. Positive and negative angle J. Fractions of an inch	A. Push and pull force B. Weight force C. Load and rolling force D. Steering stability E. Wheel trails of forward push F. Fluid pressure G. Bump steer H. Wheel runout I. Statio balance J. Dynamic balance	A. The student will be able to identify various types of steering systems B. The student will be able to explain the construction, purpose, and operation of each system C. The student will be able to record manufacturers specifications, compare and make adjustments D. The student will be able to service and repair the following steering systems 1. Manual 2. Power 3. Rack and pinion 4. Profile E. The student will be able to perform a fron end safety check F. The student will be able to troubleshoot steering problems G. The student will be able to service a power steering pump H. The student will be able to perform wheel alignment to specifications

UNIT: BRAKE SYSTEM

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of the brake system	A. Covers construction and operation of the brake system 1. Drum 2. Manual and power 3. Cabel and linkage B. Explain the purpose of each system C. Describe the difference between systems D. Identify various master and wheel cylinders E. Identify various calipers F. Explain types of brake lines G. Describe the job of the proportioning valve H. Identify stop light switches	A. Functional reading skills B. Writing skills C. Spelling D. Vocabulary E. Trade talk F. Film G. Performance tasks H. Demonstrations I. Teaching aids J. Handouts K. Manufacturers specifications	A. Whole numbers B. Fractions C. Manufacturers specifications D. Measurements E. Micrometer F. Dial indicator	A. Force B. Weight C. Friction D. Pressure E. Self adjuster F. Fluid G. Vaccum H. Heat	A. The student will be able to explain how a brake system works B. The student will be able to identify various types of systems used today C. The student will be able to perform a brake safety check D. The student will be able to service and repair a brake system E. The student will be able to troubleshoot a brake system F. The student will be able to describe in detail various possibl brake troubles and causes G. The student will be able to service emergency brake system H. The student will be able to service master cylinder and wheel cylinder I. The student will be able to repair or replace rotor and/or caliper J. The student will be able to cut to the manufacturers specifications

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of tires and wheels	A. Describe tires and tubes construction B. Covers tire service C. Identify tires 1. Bias 2. Radial 3. Racing tires 4. Off road D. Discuss purpose of tire compound E. Identify space saver tires F. Discuss tire wear and possible causes G. Describe tube and tubeless tires H. Identify how to read tire size I. Cover wheel balancing	A. Functional reading skills B. Writing skills C. Spelling D. Handout E. Vocabulary F. Trade talk G. Tasks H. Demonstration I. Identifying main ideas	A. Whole numbers B. Fractions C. Weights and measurements	A. Tire pressure B. Tire compound 1. Cool patch 2. Heat patch C. Friction D. Rotation E. Scuffing	A. The student will be able to identify various types of tires and record their make, size and compound B. The student will be able to describe various kinds of tire service and the purpos of construction C. The student will be able to perform tire service 1. Inspection 2. Removal 3. Repair 4. Replace tires 5. Tire correct psi 6. Tire rotation D. The student will be able to perform tire and rim change E. The student will be able to perform tire balancing - static and speed type F. The student will be able to repair tube an tubeless tires G. The student will be able to service rim, replace valve, and check for leaks

UNIT: HEATING AND AIR CONDITIONING

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
	A. Covers construction and operation of heating, air, and defrost systems B. Describe various types and styles C. Explain how each system works D. Describe how various valves and components operate together E. Describe various sensors operation F. Identify types of thermostates G. Explain fan motion H. Describe air conditioning components and how they work	A. Functional reading skills B. Writing skills C. Spelling D. Film E. Outlining and note taking F. Demonstrations G. Teaching aids H. Performance tasks I. Service manuals	A. Whole numbers B. Fractions C. Decimals D. Ratio	A. Temperature 1. Hot 2. Cold B. Vacuum C. Vapor and gas D. Compression E. Recirculate F. Evaporation G. Pressure	A. The student will be able to explain how heating and air conditioning works B. The student will be able to discuss various types and identify each C. The student will be able to service and repair heating system procedures D. The student will be able to troubleshoot 1. Control valves 2. Sensors 3. Electrical 4. Vacuum E. The student will be able to explain the job of each air conditioning component and check each for leaks F. The student will be able to troubleshoot the air conditioning test system and identify the trouble G. The student will be able to perform the evacuation and charging of the air conditioning system H. The student will be able to service the compressor using gauges

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of emission controls	A. Covers why emission controls are needed B. Explain the various control devices C. Describe how each works 1. P.C.V. system 2. Evaporating 3. Exhaust 4. Catalytic D. Explain dangers from smog and pollution E. Explain how it can help or hinder performance F. Explain New Jersey State Inspection G. Describe (ECM) system	A. Functional reading skills B. Writing skills C. Spelling D. Film E. Outlining and note taking F. Teaching aids G. Tasks H. Service manuals	A. Manufacturers specifications B. Whole numbers C. Percentages	A. Combustion B. Pollution C. Hydrocarbon (HC) D. Water (H_2O) E. Carbon dioxide (CO_2) F. Nitrogen oxides (NO_x) G. Vapors H. Atmosphere I. Gravity	A. The student will be able to describe how to service the various emission control devices B. The student will be able to identify various systems C. The student will be able to record, check specifications, and make adjustments D. The student will be able to troubleshoot each system and check operation E. The student will be able to service and repair worn or defective parts F. The student will be able to perform New Jersey State inspection check list G. The student will be able to make adjustments to state specifications

UNIT: WELDING

TOPIC:

TASK	THEORY	COMMUNICATION SKILLS	MATHEMATICS SKILLS	SCIENCE KNOWLEDGE	STUDENT OUTCOME
I. Analysis of gas welding	A. Covers 1. Gas welding 2. Electric welding 3. Torch cutting B. Explain safety procedures and set up C. Discuss types of flames D. Explain light up and shut down procedure E. Explain 1. Filler rod 2. Brazing	A. Functional reading skills B. Handouts C. Safety film D. Demonstration E. Tasks	A. Ratio of fuel Gas to oxygen B. Angular measurements	A. Fuel B. Acetylene C. Heat energy D. Expansion E. Heat transfer F. Change of state in solids	A. The student will be able to recognize safety hazards B. The student will be able to identify damaged equipment C. The student will be able to select proper nozzle D. The student will be able to properly set gauges E. The student will be able to safely conduct the light up and shut down procedure F. The student will be able to perform welding tasks 1. Fusing 2. Filler 3. Brazing
II. Analysis of arc welding	A. Explain safety B. Discuss elements of process C. Explain advantages D. Idenitfy various types of rods	A. Functional reading skills B. Handouts C. Safety film D. Demonstration E. Tasks	A. Basic whole numbers B. Fractional computation	A. Polarity B. Current C. Voltage	A. The student will be able to properly set up and operate arc welding B. The student will be able to identify various metals and choose correct rod C. The student will be able to perform welding task and check for defects